

CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH

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EDITOR

*The Importance, Use and Essentials of Statistics**

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It is obvious that no one can give in twenty minutes the essentials of statistics. Had the subject been the essentials of statisticians we might have answered in a few words, honesty, integrity, openmindedness, and a thorough knowledge of the subject. While this last part of my topic is too extensive to be covered, the first part, the importance of statistics, is so obvious that we should waste our time in discussing it. Having thus summarily disposed of two-thirds of our subject, we may, with some profit, I hope, spend the rest of our time on the other third, the one most important to us as health administrators, the use of statistics. And even here we will confine our thoughts to statistics, not in the abstract, but as they affect or should affect us in the every day problems that arise in our work.

Statistics have well been called the bookkeeping of the health department. What business dealing with as great a number of customers as the health department would trust its books to an untrained clerk? Yet, how many health departments have on their staffs a trained statistician? Is it too much to expect that the vital bookkeeping of a community be placed in the hands of a qualified person? The expert accountant or bookkeeper does a great deal more than make entries and balance the books; he is of inestimable value to the executive by working with the managers, superintendents and foremen in cutting costs and increasing efficiency. Just so the trained statistician can assist the health officer in all of his problems,

showing where the greatest fields for work lie, what returns may be expected, and what the work has accomplished.

Who amongst us would undertake a problem in bacteriology or in sanitary engineering without first consulting the bacteriologist or the engineer? It is equally important to consult and receive the help and guidance of the statistician in every problem involving statistics, which means every problem of a health department.

Let us look at some of the ways in which the statistician may assist us and keep us from making statistical "boners." For instance, how many of us know when to use the arithmetic mean, the weighted average, the median, or the mode of a series of observations in order to obtain the information we are seeking? The statistician who understands our problem can tell us which to use or may even tell us that none is applicable to the problem at hand.

Notice that I said in the last paragraph, the information we are seeking, not the conclusions we desire to reach. Every problem should be approached with an open mind and statistics used to give us information. If the statistics show our previously conceived ideas to be wrong, then the statistics are just as valuable, sometimes more so, than if they confirmed those ideas. Yet how often we find statistics based on inadequate, inaccurate, and incomplete data being used to "prove" some pet theory or opinion, and because the conclusions are reached through statistical procedures the results are given the semblance of

* Read before Health Officers Section, League of California Municipalities, Monterey, September 23, 1931.

accuracy that they do not possess. As Wilson (1) says, "It is probably more dangerous to apply statistical methods to unreliable material than to apply a well balanced judgment to the material without statistical analysis."

Dunn (2) shows that statistics are necessary so that we can visualize mass data. We can visualize the heights of three individuals in a room but if the number is increased to one hundred we have to use the average or some other measure of variation in order to obtain a mental picture of the group. This is a statistical procedure and the statistician can best tell us what measure of variation to use in order to give us the best picture for our needs. Let us take this illustration of Dunn's and enlarge upon it. Suppose, for instance, that we increase the group which we wish to observe from one hundred to one hundred thousand, or even a million. It will be impossible to measure the heights of every individual in such a large group, so some means of taking samples will have to be resorted to. In order that the information obtained regarding our samples may be applied to the whole group we have to know how to select our individuals and how many observations to make. Only the statistician who understands what we are looking for can give us the proper method to pursue in order that our samples will be valid. This is well shown by Fisher (3) when in writing about the number of observations necessary in experimental work he states that while we all realize the need for at least duplicate experiments, many of us do not know that when we desire "to place a high degree of confidence on the results, triplicate experiments will, in some cases, enable us to detect differences as small as one-seventh of those which, with duplicate experiment, would justify the same degree of confidence."

How often do we try to compare statistics that are incomparable? In 1915 Dr. Levy, then health officer of Richmond, Va., told me the following incident: A man living in one of the northern cities wrote Dr. Levy that he would like very much to live in Richmond, but felt that because the death rate was higher than in his home city it would involve too great a health hazard. Dr. Levy wrote him to come ahead, that the death rate among the whites in Richmond was lower than among the whites in his own home town. He received a reply stating that while this might be true he didn't wish to live in a city with such a high negro death rate for it must mean unsanitary conditions of some sort. Dr. Levy then wrote telling him that the death rate among the negroes was lower in Richmond than in his home town, and that if he placed so much reliance on mortality statistics he should surely come to Richmond, where, according to

his own ideas, he would have a better chance of living whether he were white or black, in spite of the fact that the combined death rate was higher in Richmond.

Another grievous fault that we all have is confusing association, or correlation, with causation. Because two sets of phenomena are associated in time and space we conclude that they are associated as cause and effect. In many instances we are correct and the causal relationship is so obvious that statistical methods would be of no added value. But in other instances the phenomena may be so involved, with so many factors to be considered, that only statistical procedures can lead us to the correct solution. Let me remind you of the many "successful" measures used in controlling influenza during the pandemic of 1918-19; masking in certain of our California cities, quarantine and isolation in others, and in one small mining community, even the dusting of sulphur in the shoes of all the men.

Again, how often do we use statistics for purposes of propaganda. We take great credit to the health department and pat ourselves on the back when the death rate drops a point or two, letting it be generally known how efficient our work has been. Will we give equal publicity when the rate goes up, tell the public how we have failed in our work, and resign from our jobs? I do not mean that proper statistics should not be used to show the results of our endeavors, but we should be sure that they are proper and not take credit unless we know that credit is due. In an article showing the importance of reporting disease, Dublin (4) cites, as an illustration of the value of prompt reporting, the control of an outbreak of poliomyelitis in Buffalo in 1912. He states that because of early reporting of 218 cases and the isolation of every case "it was possible to prevent its further spread among the foreign population, where it had its widest development." I wonder if, in the light of our present knowledge of carriers and abortive cases in this disease, his statement is not open to criticism?

There are other statistical errors into which we may easily fall unless we are guided by a trained person, but I hope that I have shown, not so much the use of statistics as the use of statisticians. No health department can properly evaluate the data that come to it regarding births, deaths, and disease without the trained statistician; no health officer can properly approach his problems or place confidence in his conclusions without the assistance of such a person. By a statistician I do not mean merely a person who is trained to use statistical methods and procedures, but one who uses them understandingly and carefully, with a full knowledge of their possibilities and limitations. By the assistance of the statistician to the

health officer I do not mean his purely mathematical assistance but the assistance that he can give in helping to lay out the problem so that the information collected will be accurate, adequate, and complete. The health department with this sort of cooperation and understanding between the statistician and the health officer is indeed fortunate and observations and experiments conducted by it should add greatly to our knowledge of public health.

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3. Fisher, R. A. Statistical Methods for Research Workers, p. 111.
4. Dublin, L. I. The Reporting of Disease—The Next Step in Life Conservation. Pub. Health Reports, Vol. 29, No. 25, p. 1611, June 19, 1914.

LIABILITY IN TYPHOID FEVER

Because of the fact that individuals employed in labor camps have been furnished raw river water, and have contracted typhoid fever, it is probable that this practice will be taken into the courts. The liability of cities to furnish pure water supplies has been established definitely by the courts. It is not known that the liability of employers to furnish pure water to labor camps has ever been acted upon by the courts, but it would appear that the liability of such employers of labor will be tested in cases that are now pending.

JAMS AND JELLIES

At the request of the manufacturers, an investigation of jams and jellies was undertaken last month by the Bureau of Food and Drugs. A general survey of the jam and jelly manufacturing business was inaugurated. The consumer's interest is involved in this investigation, since it has to do with proper labeling of imitation products. It is believed that better results can be obtained through direct inspection of the manufacturing establishments than through a policy of random sampling and analysis. A total of forty-two jam, jelly, syrup and extract manufacturing plants were inspected during the past month.

SOQUEL CREEK SURVEY

At the request of the Capitola Chamber of Commerce an investigation of conditions with reference to sewage disposal from Soquel Creek was undertaken. To date, 34 premises bordering upon the creek have been inspected. An effort is being made to improve sanitary conditions in this vicinity. An investigation of the water supplies of Capitola and the town of Soquel was made.

COLD STORAGE INVESTIGATION

During the past month an investigation was undertaken to determine how the Cold Storage Act is being observed with respect to the requirement that persons owning articles of food in storage for one year must have a permit from the State Department of Public Health in order to obtain an extension of the storage period. The investigation revealed the fact that considerable amounts of foodstuffs had been in storage for twelve months. Correspondence with the owners of the products has resulted in compliance with the regulation pertaining to obtaining permits for the extension of the storage periods.

At the end of the quarter, June 30, 1931, there were held in cold storage in California warehouses nearly ten million pounds of fresh fruit; more than six million pounds of vegetables; nearly six million pounds of meat; three and one-fourth million pounds of poultry; nearly four million pounds of dried, frozen and preserved fruit; two million pounds of fish; nearly one and one-half million pounds of citrus fruits; two and three-fourths million pounds of cheese; two and three-fourths million pounds of butter; six and three-fourths million pounds of eggmeat; and one and one-fourth million cases of eggs.

APPLICATION FOR SEWAGE DISPOSAL PERMIT

The following application for sewage disposal permit is pending before the State Board of Public Health, action to be taken at the next meeting of the board to be held in Room 337 State Building, San Francisco, October 17, 1931:

SIGNAL HILL—To maintain an Imhoff tank, sprinkling-filter, sand-filter plant on a portion of Lot 1, Tract 732, on Twenty-eighth street west of Junipero avenue in Signal Hill; and dispose of a chlorinated effluent for cooling water uses in refineries or to the Los Angeles Flood Control channel through the Oil Operators, Inc., waste water disposal system.

RABIES CONTROL ADVANCES

A survey of the rabies situation in Fresno, Kings and Tulare Counties was made. In Fresno County during the past few months more than 12,000 dogs have been vaccinated against this disease, and more than 500 homeless dogs have been destroyed. In Kings County more than 500 dogs have been vaccinated and more than 1000 homeless dogs have been destroyed. A large amount of control work has also been accomplished in Tulare County.

What I call a good patient is one who, having found a good physician, sticks to him till he dies.—*Holmes.*

MORBIDITY***Diphtheria.**

61 cases of diphtheria have been reported, as follows: Livermore 1, Fresno 1, Brawley 2, Kern County 1, Kings County 1, Los Angeles County 7, Alhambra 1, El Monte 2, Glendale 4, Huntington Park 1, Los Angeles 18, San Fernando 1, Vernon 1, Torrance 3, Orange County 2, Anaheim 1, Fullerton 1, Riverside County 4, San Jose 2, Willow Glen 2, Red Bluff 1, Tulare County 1, Ventura 3.

Scarlet Fever.

67 cases of scarlet fever have been reported, as follows: Albany 1, Oakland 5, Pittsburg 1, Kern County 3, Kings County 1, Los Angeles County 6, Alhambra 1, Compton 1, Huntington Park 1, Long Beach 1, Los Angeles 18, South Gate 1, Maywood 1, Fort Bragg 2, Monterey County 3, Orange County 4, Sacramento County 1, San Francisco 7, San Joaquin County 2, Stockton 1, San Luis Obispo 1, San Jose 1, Sonoma County 1, Stanislaus County 1, Yuba City 1, Ventura 1.

Measles.

71 cases of measles have been reported, as follows: Alameda County 2, Berkeley 1, Oakland 5, Los Angeles County 2, Burbank 1, Glendale 1, Long Beach 1, Los Angeles 22, Signal Hill 1, Riverside 1, Sacramento 3, San Francisco 23, Stockton 1, Santa Cruz County 1, Santa Cruz 4, Ventura County 1, Ventura 1.

Smallpox.

9 cases of smallpox have been reported, as follows: Kings County 1, San Francisco 5, Los Gatos 2, Vallejo 1.

Typhoid Fever.

15 cases of typhoid fever have been reported, as follows:

* From reports received on October 12th and 13th for week ending October 10th.

Richmond 3, Holtville 1, Kern County 1, Los Angeles County 1, El Segundo 1, Los Angeles 2, Sacramento 2, Sonoma County 3, Tulare County 1.

Whooping Cough.

83 cases of whooping cough have been reported, as follows: Alameda 1, Berkeley 4, Oakland 3, Los Angeles County 11, Azusa 1, Inglewood 1, Long Beach 3, Los Angeles 14, Santa Monica 2, Sierra Madre 2, Plumas County 3, Chula Vista 1, San Diego 10, San Francisco 12, San Joaquin County 5, Lodi 3, Manteca 1, Stockton 1, San Jose 1, Sunnyvale 2, Ventura County 1, Ventura 1.

Meningitis (Epidemic).

3 cases of epidemic meningitis have been reported, as follows: San Francisco 2, San Mateo County 1.

Leprosy.

Ventura County reported one case of leprosy.

Poliomyelitis.

6 cases of poliomyelitis have been reported, as follows: Oakland 2, Susanville 1, Compton 1, Merced 1, Burlingame 1.

Beri-Beri.

Long Beach reported one case of beri-beri.

Jaundice (Epidemic).

Culver City reported 2 cases of epidemic jaundice.

Food Poisoning.

Turlock reported one case of food poisoning.

Coccidioidal Granuloma.

Placencia reported 2 cases of coccidioidal granuloma.

Septic Sore Throat.

Glendale reported one case of septic sore throat.

COMMUNICABLE DISEASE REPORTS

Disease	1931				1930			
	Week ending			Reports for week ending Oct. 10 received by Oct. 13	Week ending			Reports for week ending Oct. 11 received by Oct. 14
	Sept. 19	Sept. 26	Oct. 3		Sept. 20	Sept. 27	Oct. 4	
Anthrax.....	0	0	0	0	0	0	3	0
Beri-beri.....	0	0	0	1	0	0	0	0
Botulism.....	0	1	0	0	0	0	0	0
Chickenpox.....	53	43	67	90	64	107	88	104
Coccidioidal Granuloma..	0	2	3	2	2	0	1	0
Diphtheria.....	35	60	71	61	19	45	43	55
Dysentery (Amoebic)....	1	0	0	0	0	1	1	0
Dysentery (Bacillary)...	5	4	11	4	6	4	3	3
Encephalitis (Epidemic)...	1	1	1	0	2	6	1	1
Erysipelas.....	6	10	11	6	5	6	7	7
Food Poisoning.....	11	6	44	1	8	4	1	4
German Measles.....	6	8	5	6	3	1	7	7
Gonococcus Infection....	156	134	163	162	149	110	132	144
Hookworm.....	0	0	1	0	0	0	0	0
Influenza.....	27	23	30	73	11	29	31	26
Jaundice (Epidemic)....	1	0	0	2	0	0	0	1
Leprosy.....	0	0	0	1	0	0	1	0
Malaria.....	1	2	0	3	0	0	1	1
Measles.....	86	38	67	71	42	60	82	62
Meningitis (Epidemic)...	3	6	7	3	2	4	0	3
Mumps.....	46	64	44	58	95	111	118	90
Ophthalmia Neonatorum...	0	1	2	0	0	0	0	0
Paratyphoid Fever.....	2	2	4	0	1	1	0	0
Pellagra.....	2	2	1	1	2	5	3	0
Pneumonia (Lobar).....	23	37	34	42	26	58	22	42
Poliomyelitis.....	9	10	6	6	68	76	70	57
Rabies (Animal).....	4	8	4	4	9	26	13	6
Scarlet Fever.....	55	67	107	67	37	68	82	75
Septic Sore Throat.....	1	4	1	1	0	0	0	0
Smallpox.....	5	5	4	9	8	18	16	22
Syphilis.....	184	170	194	157	187	130	161	155
Tetanus.....	1	4	2	1	0	2	0	1
Trachoma.....	2	2	10	4	3	4	1	1
Trichinosis.....	0	1	1	0	0	1	1	1
Tuberculosis.....	195	203	230	164	190	232	226	173
Tularemia.....	0	0	2	0	0	1	0	0
Typhoid Fever.....	33	9	26	15	18	19	18	13
Undulant Fever.....	3	3	2	0	2	6	3	3
Whooping Cough.....	105	113	95	83	112	88	100	110
Totals.....	1,062	1,043	1,250	1,098	1,071	1,223	1,236	1,167

Most of the reportable diseases are on stationary levels.

A case of beri-beri was reported last week.

Two cases of epidemic jaundice were reported and two cases of coccidioidal granuloma.

Typhoid fever is less prevalent.

Poliomyelitis remains at a low stage.